Submission to the Royal Commission on Electric Power Planning

Ministry of Treasury, Economics
and Intergovernmental Affairs

May 1976

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NOTE

In earlier reproductions of this Submission, pages 25a and 30a were attached as an Addendum.

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I. ROLE OF MINISTRY OF TREASURY, ECONOMICS AND INTERGOVERNMENTAL AFFAIRS

I. THE ROLE OF THE MINISTRY OF TREASURY, ECONOMICS AND INTERGOVERNMENTAL AFFAIRS

This section outlines the responsibilities of the Ministry of Treasury, Economics and Intergovernmental Affairs. It includes some organizational background, a description of the major responsibilities of the Ministry, and elaborates briefly on the major points of contact between these responsibilities and Hydro operations.

The Ministry of Treasury, Economics and Intergovernmental Affairs resulted from a union in 1972 of the then Departments of Municipal Affairs and Treasury and Economics. The basic objective was to provide for coordinated economic and fiscal planning as it related to provincial matters as well as the federal and local levels of government. Accordingly, the Ministry was given direct operational responsibilities in the areas of fiscal planning and cash management and coordinating responsibility for provincial-local and federal-provincial relations, particularly in questions dealing with organization and finance. It was also given broad responsibilities in the area of economic policy development, which included the development of regional strategies, and, in conjunction with other Ministries and the Policy Fields, general development of economic policies.

The basic responsibilities of the Ministry have remained substantially unchanged since its creation. However, some areas such as community planning and implementation

of certain projects have been transferred to other areas of the government. In more specific terms, the Ministry has seven areas of operational responsibility (in addition to internal administration), each administered by a division within the Ministry.

1. Fiscal Policy: This includes the coordination of the preparation of the Provincial budget, and, in particular, the financing of the province's expenditure plan. The second major responsibility in this area includes provincial-local and federal-provincial finance. These responsibilities are administered by the Fiscal Policy Division.

2. Cash Management, Provincial Borrowing and Accounting: This includes management of provincial cash reserves, borrowing, investment and monitoring of accounting policy for all government ministries (Treasury Division).

3. Economic and Regional Development: This includes the development of broad economic and regional policies for the province and the development of strategies for specific regions. It also includes, in conjunction with other ministires and the Policy Fields, the development of sectoral economic policies (Office of Economic Policy).

4. Local Government: This covers policy with respect to the organization and functions of local governments, and services to and liaison with local governments through regional offices and the Municipal Liaison Committee (Local Government Division).

5. Project Implementation: This covers the coordination of the implementation of a variety of specific projects such as the Parkway Belt and the provision of infrastructure to northern communities.

6. Federal-Provincial Affairs: This includes the responsibility for monitoring federal-provincial activities across all ministries and advising on constitutional issues as well as other federal-provincial and interprovincial policies (Intergovernmental Relations Division).

7. Provincial Statistics: The Statistical Services Division is the central provincial agency for the collection and organization of provincial statistics and liaison with Statistics Canada.

One of the central responsibilties of the Treasurer is the management of provincial debt policy. Since the debt of Ontario Hydro is guaranteed by the Province of Ontario, Hydro's debt management operations form an integral part of these responsibilities. Accordingly, the Treasurer and the Chairman of Hydro ensure that the structure and timing of Ontario Hydro financing is consistent with the overall fiscal policy of the province.

The planning and implementation of Hydro facilities could play an important role in supporting and shaping the economic development of Ontario. This relates to supporting basic economic growth by ensuring an adequate supply of electric power to homes and industries, the impact of hydro generating and transmission facilities on communities and land use patterns and the short and longer run economic impact of Hydro financing. The role of Treasury with respect to these issues is to provide both broad policy directions and advice on specific issues primarily through the Advisory Committee on Regional Development, a Committee of Deputy Ministers, which is chaired by the Deputy Treasurer, and its subcommittees and working groups.

The major interests and concerns of the Ontario Treasury with respect to the longer run development of Hydro are outlined in the following sections of this submission.

II. LONG-RUN ECONOMIC DEVELOPMENT PRIORITIES IN ONTARIO

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This section reviews the province's long-run economic development priorities. Its purpose is to provide a broad perspective both for the sections which follow and for the Commission on the long-run economic priorities of the province.

Governments are traditionally reluctant to produce firm long-run projections of the future; the nature of change is not very predictable. At the same time, it is recognized that the Commission on Electric Power Planning must deal with the future, however difficult it may be to predict, and make recommendations based on the best knowledge and forecasting available. Accordingly, the Ministry will attempt to assist in that process by providing the best possible analysis based on existing knowledge and perspectives.

Economic policies in all parts of the world -- both industrialized and developing -- face a basic dilemma. On the one hand, a high level of economic growth produces benefits for society in terms of rising incomes, higher levels of consumption and improved social services. In addition, economic growth provides the means for redistributing income and thus improving social and economic stability. On the other hand, economic growth produces undesirable side effects, of which society is becoming increasingly conscious. Among these are pollution, depletion of natural resources, improper land use and urban sprawl.

More recently, new economic challenges have emerged. These relate to containing the rate of inflation and refurbishing the private sector so that it can continue to create a healthy rate of economic growth.

As a wealthy, expanding and industrialized province, Ontario has been squarely confronted with these problems. Looking back over the past decade, its response can be traced through three overlapping stages. First was the reorientation of government policy and organization towards improving the quality of urban and rural life in the province, while, at the same time, maintaining a strong rate of economic growth. The next priority was to substantially reduce the growth of government spending in order to fight inflation and to ensure that the private sector could continue to generate a healthy rate of economic growth and job creation. The third stage, which is becoming a major priority for the future, is to build and implement a development strategy based on new international and domestic economic realities particularly much tougher competition abroad and including dramatic changes in the energy sector.

The first stage, evolving over the past ten years, has embraced both major shifts in the composition of provincial expenditures and comprehensive organizational changes at the provincial and local levels. In summary, this first stage involved:

- a reorganization of the provincial government into the policy field system in order to facilitate broad coordination of policy development and to ensure that the impact of the policies of one ministry is measured in terms of the priorities of other parts of government before they are implemented;

- a reorientation of provincial expenditures (particularly on the capital side) towards environmental control, housing and energy and creation of new ministries to deal with environment, housing, energy and culture;

- the reorganization of some local governments which have jurisdiction over the large urban areas to ensure better planning responsibility at the local level and to create a stronger system of local accountability as a basis for decentralizing planning controls and other responsibilities from the provincial level. Along with these actions, the province substantially improved the financing base of local government; and

- the creation of a regional development framework to facilitate the development of broad regional strategies.

Having shifted the economic and social policy development apparatus towards the blending of economic and social goals, priority attention at this point in time is increasingly focused upon the rate of government expenditure growth. In Ontario, and virtually all other jurisdictions in the western world, the problem of public spending became all too evident in 1975 as inflation bloated government spending while revenues, dampened by a slow rate of economic growth, did not keep pace. The consequent threat of large and growing deficits along with the public sector taking an even greater share of total output, led to a range of measures being proposed and implemented to cut back government spending growth.

At the same time, another major Canadian problem became apparent. Increasingly, the Canadian economy has been losing ground to its international competitors. In part, this is related to Canada's deteriorating position in energy trade, but more immediately it is related to a relatively poorer record of productivity growth in the manufacturing sector.

These factors have tended to swing the pendulum towards basic economic issues; specifically, reducing the rate of inflation, controlling government spending and developing an economic strategy to improve Canada's competitive position. Thus, viewed from the perspective of today, the longer run economic priorities of Ontario would appear to be:

- Jobs and Growth: Reinforce short-run economic growth and expansion in jobs in the private sector, until the rate of labour force growth slows down, by curtailing the rate of public sector expansion.
- Economic Stability: Establish longer run economic stability by permanently reducing the level of inflation.
- Productivity and Competition: Develop a comprehensive economic strategy for improving Canada's world trading position.
- Quality of Growth: Ensure that future economic growth is more closely coordinated with priorities of economic quality including the improvement of the natural and urban environment, conservation of resources and regional economic and social development.

The Ontario government has recently outlined some views with respect to these priorities in both the 1976 Budget Statement and the set of regional development reports which were released on April 8.[1] It is not necessary to summarize these statements here since they are available to the Commission and, where necessary, they will be cited in the detailed sections of this submission.

However, at this juncture it is useful to make some general observations about the future economic development of the province, particularly as it is related to the future development of Ontario Hydro:

> First, a healthy rate of economic development and job creation will continue to be a long-run economic priority of the province. This development must be supported by the expansion of the electric power system.

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1. The Honourable W. Darcy McKeough, "A National Economic Policy for Canada", Budget Statement, Ontario Budget, 1976.

   The Honourable W. Darcy McKeough, "Protecting Ontario's Future Through Managed Growth", April 8, 1976. Accompanying this statement the following reports were tabled:
   "Ontario's Future: Trends and Options";
   "Toronto-Centred Region Program Statement";
   "The Durham Subregion: A Strategy for Development to 1986";
   "Northeastern Ontario Regional Strategy";
   "Statistical Appendix to the Northeastern Ontario Regional Strategy";
   "Renfrew County Development Strategy";
   "Ontario's Changing Population Volume 1";
   "Ontario's Changing Population Volume 2"; and
   "A Strategy for Ontario Farmland".

Second, future economic development will increasingly depend on productivity improvement rather than simply on labour force growth. Accordingly, long-run policy for the provision of electric power should be geared to improving productivity in terms of both power delivery and efficiency of utilization.

Third, the economic expansion should primarily be based on private sector growth. This involves containing the rate of government revenue and expenditure growth and ensuring that adequate capital is available to the private sector. Accordingly, resources available to public enterprises will be somewhat constrained over the longer term.

Fourth, future economic expansion should increasingly concentrate on qualitative aspects. While this involves improving productivity performance, it must also be consistent with improving the urban and rural environment. Accordingly, the development of the electric power system should be coordinated with provincial, regional and economic development priorities.

Subsequent sections of this report deal with particular aspects of the development of the electric power system in Ontario, in relation to these themes.

III. DEMAND FOR ELECTRIC ENERGY IN ONTARIO

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Perspective

One of the key questions to be considered in planning expansion of the provincial power system is the expected growth in demand for electric energy. This question is central to deliberations on the need for facilities, the number of sites, resource requirements, capital requirements and provincial planning policies.

The past two and a half decades have witnessed steady improvement in the province's capacity to meet its own demands for electric energy. In 1950, provincial generation fell short of provincial consumption by more than 20 per cent, but in the early 1970's the shortfall has been well under 10 per cent. With generation outpacing consumption, the result has been increased import substitution relative to export expansion. In the years ahead, self-sufficiency in excess of 90 per cent can be protected adequately by keeping growth in provincial generation in line with growth in provincial demand.

Electricity consumption in Ontario's residential, manufacturing, mining and commercial sectors rose from 16.5 billion KWH in 1950 to 72 billion KWH in 1972, an increase of 336 per cent. By far the strongest growth in consumption

occurred in the commercial services sector which registered an 817 per cent increase in this period. This compares with 430 per cent in the residential sector, 278 per cent in mining and 184 per cent in manufacturing. Recent patterns of consumption indicate that manufacturing accounts for about 37 per cent of provincial needs (excluding losses and own use in utilities), the commercial sector 31 per cent, the residential sector 27 per cent, and mining the balance of about 5 per cent.

What are the future trends in electric energy demand in Ontario likely to be? The answer is 'No one really knows for sure'. However, such an answer is unsatisfactory to planners and decision-makers in areas where long lead times and process inertia are involved in bringing supplies on stream.

In the absence of perfect socio-economic forecasting techniques, projections are usually based on methods which place varying degrees of emphasis on pure guesswork, judgements and impersonal statistical formulae derived from data reflecting past experience. Since the future will always hold surprises it cannot be asserted that any one method will predict exact outcomes or even outcomes with a known probability. In making any projection, therefore, it seems prudent to indicate as clearly as possible the considerations that might have a bearing on outcomes and the extent to which guesses, judgements and past experience are taken into account.

In the attempt to gauge future demand, the Ontario Treasury conducted a study to determine the major factors that contribute to demand growth. Using econometric techniques, the study isolates the influences of demography, income, prices and output in the past and projects the demand for electricity under alternative combinations of these influences. In addition, the study examines the effects of some unpredictable but hypothetical shifts in the future availability of competing fuels, essentially oil and natural gas. The following sub-sections elaborate on this analysis of future energy demand in Ontario.

Determinants of the Demand for Electricity in Ontario

The purpose of this sub-section is to specify the major determinants of the demand for electricity in Ontario. Economic theory suggests that, under very general conditions, demand in the residential sector -- which reflects the behaviour of households -- would be influenced by population changes, variation in the income and wealth position of households, changes in the price of electricity relative to prices of competing forms of fuel and other consumer goods, and changes in the price of complements (electrical durables, in particular). Theory also suggests that, in the business sector, enterprises would vary their consumption of electricity in response to changes in the level of production, changes in the price of electricity relative to prices of competing energy forms used in production processes and relative to the prices of products embodying energy inputs.

A broad survey of demographic and economic conditions of the period from 1960 to the early 1970's lends support to these generalizations in the Ontario context.

During the 1960's, Ontario's population base expanded at an annual average rate of about 2.2 per cent. While this represented a slowing down from the 3.1 per cent of the earlier decade, it was quite high by historical standards. The addition of some 1.5 million to the population in the 1960's was attributable both to strong natural increase and significant net in-migration of about 60,000 per year. The early 1970's witnessed further slowing down in the rate of population increase under conditions of a declining birth rate and reduced net in-migration.

The Ontario economy expanded rapidly in the favourable conditions of the 1960's. Growth in provincial and national population levels generated strong domestic demand for goods and services and permitted adequate elasticity in the supply of labour. The external value of the Canadian dollar was pegged at a substantial discount and provided a strong impetus to exports, particularly of Ontario's manufactured goods. The Auto Pact came into effect giving a massive boost to investment, employment, exports and income in Ontario.

Buoyant conditions were reflected in almost every aspect of economic activity. The real gross provincial product expanded at an average annual rate of 6.4 per cent. Real consumer spending gained at a rate of 5.6 per cent per year in response to strong growth in disposable incomes and in the housing stock. The markets for major household durables -- cooking appliances, refrigerators, freezers, clothes washers and dryers, hot water heaters, air conditioners, etc. -- all benefited from the increases in population and purchasing power. Production and employment gained substantially in the manufacturing and service sectors and, to a lesser extent, in mining. Inflation was never really a major issue in the 1960's, though towards the end of the decade price increases in excess of 4 per cent were being considered unacceptable.

In the energy area, the supply from various sources was expanding far more rapidly than the overall demand. Major distribution systems had been put in place for bringing oil and natural gas to Ontario's burgeoning markets, and severe price competition not only prevented dramatic shifts in the relative prices of competing fuels but also brought about a decline in energy prices relative to the general level of prices in the economy. In addition, the prices of household durables tended to decline in relation to the aggregate price level for goods and services.

In general, then, demographic and economic conditions of the 1960's were extremely favourable to rapid growth in the demand for all forms of energy and, despite the penetration attained by natural gas and oil, Ontario's demand for electricity grew at a rate of close to 7 per cent per year. It was coal that suffered in strong competition for a larger share of the energy market.

By the mid 1970's, many of these favourable conditions were changing. A recession in 1970 has been followed by a much longer and more severe recession in 1974-75. Inflation has hit both the international and domestic economies. Energy prices have escalated rapidly and significant shifts are occurring in the regional balance of economic power. And the population base of Ontario is expanding at a much slower rate than in the last decade.

Using annual data for the period 1960 to 1972, econometric methods were employed to obtain quantitative relationships between the demand for electricity in various sectors of the Ontario economy and indicators of demographic and economic conditions.

In the residential sector it was found that population size, real disposable income per capita, the price of electricity relative to that of natural gas, and prices of electrical durables relative to the general level of consumer prices tend to be main determinants of household consumption of electricity.

In the business sectors -- mining, manufacturing and commercial services -- changes in the level of production (arising from employment or productivity), the price of electric energy relative to the general level of output prices, and the price of electricity relative to that of natural gas were found to be the main forces contributing to power consumption.

To give an example of what the quantitative relationships for demand suggest, one might consider the residential demand. If, as in the decade of the 1960's, it is known that Ontario's population grew at an average annual rate of 2.2 per cent, real disposable income per capita gained 2.6 per cent per year, prices of electrical durables fell by 3.5 per cent per year in relation to the Consumer Price Index, and the price of electricity rose by 2 per cent annually in relation to natural gas prices, the estimated quantitative demand function assigns weights to these determinants and gives a calculated average annual growth rate of 6.3 per cent for residential consumption. This calculation is not far off from the actual growth of 6.5 per cent.

In effect, then, one could postulate alternative scenarios for the demographic and economic determinants in future and use the relationships to project energy consumption provided, of course, that new events which might modify the relationships are taken into account.

Projections of Electric Energy Demand in Ontario

This sub-section presents alternative projections of growth in Ontario's demand for electricity to 1995. It is recognized that numerous uncertainties exist in projecting future developments that might affect the growth in energy demand. These uncertainties include demographic and economic conditions, availability of alternative energy sources, life styles and technology.

The approach used in making the projections involves essentially two stages. First, the quantitative relationships derived from 1960-72 data are employed to estimate demand growth under different scenarios for demographic and economic conditions, including pricing. Second, adjustments are made to the first stage projections to allow for possible effects of hypothetical shortages of oil and natural gas. These adjustments reflect uncertainties in a period that might be quite different from the one used to estimate earlier demand growth.

The first stage considers five scenarios for population, economic growth and energy prices.

Scenario A, used in developing a control projection, represents a likely set of outcomes for population, economic growth and prices over the next two decades. According to this scenario, the situation in Ontario might be as follows:

- Growth in population would decline steadily from about 1.6 per cent per year in the 1975-80 period to 1.1 per cent per year in the 1990-95 period. This results from a declining birth rate together with an annual net in-migration of 50,000 per year. As compared with the 1960's, population growth would be considerably slower in the next twenty years.

- Growth in the working age population would also follow a declining trend and, despite increases in participation rates, growth in the labour force would slow down from about 2.8 per cent per year in the 1975-80 period to 1.6 per cent annually after 1985.

- There could be some minor decline in the average family size but, because of the population slow down, the number of households could grow far more slowly in the next decade than in the 1960's. This provides a basis for declining growth in the stock of household durables.

- Constraints arising from the supply of labour would produce a dampening effect on overall employment growth.

- Growth in overall provincial product could follow a declining trend as labour constraints emerge and as foreign, national and provincial demands moderate from the very favourable circumstances of the 1960's, and as the drive for economic development in western Canada gains momentum from energy-related developments. The real GPP growth rate for Ontario is likely to decline from about 5.2 per cent per year in the 1975-80 period to about 4 per cent per year in the early 1990's. This compares with an average of 6.4 per cent for the 1960's.

- Inflation could continue at rates of between 7 and 10 per cent for at least the next five years, and is unlikely to fall below 5 per cent in the 1980's, because of persisting wage and resource price pressures.

- Despite inflation, real disposable income per person could grow at about 3 per cent per year into the 1980's. However, energy prices, rising considerably faster than the general level of prices, and prices of durable goods, rising more in line with the general level at least until 1985, could lead to a restructuring of consumer purchases. These price developments represent a

reversal of the situation in the 1960's and, together with some decline in growth in the number of households, they could produce some offset to growth in household durable demand arising from income growth.

- It is assumed that the ratio of electricity prices to the general price index would rise steadily to 1985 and flatten out thereafter; by 1985, the cumulative rise in the ratio from 1975 is assumed to be between 45 and 50 per cent. However, the ratio of electricity prices to prices of natural gas is assumed to drop in the 1975-80 period, and to be constant beyond that.

- While the next ten years are described in terms of sharply rising energy prices, it is assumed that physical shortages of oil and gas will not emerge in Ontario.

- Output and employment in manufacturing, mining and commercial services will continue to grow over the next two decades, but at steadily declining rates or at rates below those recorded in the 1960's. The service sector will continue to increase its share of provincial product and employment.

Scenario B differs from Scenario A (the control projection) only in respect of the assumption of electricity prices. Here, the ratio of electricity prices to the general index rises somewhat more slowly to 1985, and then declines over the subsequent ten years. Also, the ratio of electricity prices to natural gas prices declines somewhat more rapidly throughout the next two decades. In general, then, Scenario B postulates cheaper electricity than Scenario A.

Scenario C differs from Scenario A in the assumptions about population, income and employment. Here, faster growth in population and economic growth is assumed over the next two decades.

Scenario D utilizes a slower growth in population and economic growth as compared with Scenario A.

Scenario E assumes that population growth, economic growth and price increases for electricity are all higher than those assumed in Scenario A.

None of these scenarios for Ontario is as favourable to electricity consumption as the conditions of the 1960's. Growth in population and the overall economy was significantly faster in the 1960's than in each of these scenarios, and electricity and energy prices in general, which tended downward relative to other prices in the 1960's, are assumed to follow an up-trend in each scenario. Like the situation of the sixties, however, no physical energy shortages are assumed in any scenario.

If the conditions of Scenario A were to emerge, the growth in Ontario's electric energy demand could be substantially lower than that recorded in the past fifteen years. Growth in the 1975-85 period might be severely reduced in all sectors by the economic and pricing environment, and by the slowing down in population growth. Beyond 1985, even if electricity prices stabilize in relation to other prices, the effect of continued decline in population and economic growth would be to keep growth in electricity consumption well below that of the 1960's.

The commercial sector will continue to increase its share of provincial consumption; by 1995 just under half of the total would be consumed by this sector, as compared with some 33 per cent in 1975. This reflects the underlying growth in production and employment in services relative to goods-producing sectors such as mining and manufacturing. In the long run too, the decline in population growth is reflected in a drop in the residential sector's share.

Scenario A provides a base from which to consider alternative projections for growth in Ontario's electricity consumption. It shows provincial demand growing at an annual rate of about 3 per cent in the 1975-80 period, just over 3.5 per cent in the 1980-85 period, and approximately 5 per cent in the subsequent years. Starting from an estimated 84.4 billion KWH in 1975, consumption could reach 116 billion KWH in 1985 and 188 billion KWH in 1995.

Table 1 summarizes the projections for growth in Ontario's electricity demand under Scenarios A to E. In comparison with the control projection of Scenario A:

- Scenarios B and C would result in a more rapid growth in consumption, while
- Scenarios D and E would yield less rapid growth in consumption.

For any given five-year period in the 1975-85 period, the growth rates of Scenarios B to E for total Ontario consumption do not differ from those of the control projection by more than 1.1 percentage points; beyond 1985, the difference

from the control projection is at most 1.5 percentage points. In other words, under a fairly wide variety of future potential population, economic growth and pricing assumptions, the control projection provides a reasonably good approximation of expected growth in Ontario's electricity consumption.

None of the scenarios -- except perhaps B with cheap power in the 1985-1995 period -- produces growth in demand approximating that of the 1960's. Based on probable demographic, economic and pricing conditions, therefore, there seems to be doubt that future growth in electricity demand in Ontario would be sustained at the pace recorded over the last fifteen years.

GROWTH IN ELECTRICITY CONSUMPTION, ONTARIO, 1960-1995 Table 1
Alternative Scenarios (Percentage Annual Average Rates of Growth)

	Actual*		Projected				
	1960-65	1965-70	1970-75*	1975-80	1980-85	1985-90	1990-95
A. Control							
Residential	6.3	6.8	5.6	4.0	3.3	3.2	3.0
Manufacturing	5.1	5.0	3.0	2.2	2.2	2.7	2.8
Mining	-2.6	10.2	4.8	-4.4	-3.7	1.3	2.4
Commercial Services	11.5	11.5	10.0	3.6	5.7	7.8	7.7
PROVINCIAL TOTAL**	6.2	7.3	5.9	2.9	3.6	4.8	5.1
B. Control + Lower Electricity Prices							
Residential	6.3	6.8	5.7	4.4	3.7	3.5	3.4
Manufacturing	5.1	5.0	3.1	2.9	2.8	3.4	3.5
Mining	-2.6	10.2	5.3	-0.3	0.9	6.2	7.4
Commercial Services	11.5	11.5	10.4	5.2	7.3	9.5	9.5
PROVINCIAL TOTAL**	6.2	7.3	6.1	3.9	4.7	6.1	6.6
C. Control + Higher Population, Employment and Income							
Residential	6.3	6.8	5.7	4.5	3.8	3.7	3.5
Manufacturing	5.1	5.0	3.1	2.7	2.7	3.3	3.3
Mining	-2.6	10.2	4.9	-3.9	-3.1	1.8	2.9
Commercial Services	11.5	11.5	10.3	4.7	6.5	8.5	8.6
PROVINCIAL TOTAL**	6.2	7.3	6.0	3.6	4.2	5.5	5.8
D. Control + Lower Population, Employment and Income							
Residential	6.3	6.8	5.5	3.5	2.9	2.7	2.7
Manufacturing	5.1	5.0	3.0	1.9	1.8	2.4	2.4
Mining	-2.6	10.2	4.8	-4.8	-4.0	0.9	2.0
Commercial Services	11.5	11.5	9.8	2.8	4.9	7.0	6.7
PROVINCIAL TOTAL**	6.2	7.3	5.8	2.4	3.0	4.2	4.3
E. Control + Higher Population, Employment, Income and Electricity Prices							
Residential	6.3	6.8	5.3	2.4	1.9	1.8	1.6
Manufacturing	5.1	5.0	3.0	1.8	2.0	2.6	2.6
Mining	-2.6	10.2	4.2	-9.3	-7.5	-2.5	-1.5
Commercial Services	11.5	11.5	10.0	3.6	5.7	7.8	7.7
PROVINCIAL TOTAL**	6.2	7.3	5.7	1.7	2.8	3.9	4.3

*Actual data used up to 1972, Source: Statistics Canada.
**Total of four sectors shown.

The second stage in developing the projection of electric energy demand takes account of possible tightnesses in energy availability conditions in the 1980's. Recently, increasing concern has been expressed about Canada's ability to retain self-sufficiency in oil and natural gas.

If the public perceives a real threat of fuel shortages, adjustments in life styles and technology would probably occur faster than normal. There might be an induced shift to electrical power in both the residential and business sectors of the economy, greater conservation[1] of energy as a matter of private practice or public policy, more rapid improvement in the efficiency of energy-using equipment and more urgent development of alternative sources of energy.

Some of these changes could have a relatively strong impact in the 1975-85 period while others, notably the development of new energy sources like solar power, might not have an effect until much later.

The greatest impact over the next ten years on electricity demand might result from a shift by households and businesses. Preliminary analysis of substitution possibilities in the residential sector suggests that a shift

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1. Popular use of the word "conservation" carries the meaning of 'reduced consumption' regardless of whether the effect arises from changes in price, income, production, technology, attitudes and habits, or any other possible circumstance. In the present study, "conservation" is used in the rather restricted sense of reduced consumption due to changes in attitudes, tastes, habits and ethics, given any configuration of other measurable parameters.

from oil and natural gas to electricity could increase requirements in the province by some 5 billion KWH above projected 1980 levels and by about 10 billion KWH above 1985 levels. While data are not available for testing possibilities in the business sectors, one might guess that a sizeable addition to electricity demand would also occur in producing enterprises if fuel shortages were perceived as real.

The impacts of greater conservation and increased efficiency of energy-using equipment over the next ten years will, of course, be negative on electricity demand growth. The magnitude of the impacts, however, is largely a matter of guesswork. It would appear that in the case of equipment efficiency the negative effect would be quite small since it is mainly the new additions to the existing large stock that would be improved.

For the purpose of forecasting future consumption of electric power in Ontario it would be necessary to adjust the first stage projections to take account of contingencies. Such adjustments are probably more crucial for the next ten years than for the 1985-95 period, since decisions have to be made now about the need for facilities ten years hence, while decisions about need in the 1990's could be delayed without the same risks being incurred.

Treating the control projection for the 1985-1995 period as a rough approximation at this stage, one might then concentrate on adjustments for the 1975-1985 period. The procedure might be as follows:

- use the control projection as a starting point;
- adjust upward for the possibility that economic conditions might be somewhat more favourable than those assumed likely in Scenario A;
- adjust upward for the possibility of some degree of shifting to electricity by both households and industry in the event that oil and natural gas shortages are perceived as real;
- adjust downward for some minor improvements in the efficiency of electrical equipment, since such changes are likely to affect only the new stock in the next ten years;
- adjust downward to reflect the absorption of conservation practices by users over the period; and
- make no adjustment for the introduction of new alternative energy forms that have the potential of reducing electricity demand.

It seems that if these adjustments are made projections for demand and need for power facilities would be based more on risk aversion than on risk acceptance, and this kind of behaviour is not indefensible in the provision of electricity.

As an example of how the control projection for electricity demand in Ontario to 1985 might be adjusted, one might consider the following:

. Control projection average growth rate (1975-1985)	3.3%
. Allowance for higher population, employment and income as in Scenario C	+1.0%
. Allowance for some response by households to possible oil-gas shortage[1]	+0.6%
. Allowance for some response by industry to possible oil-gas shortage[2]	+1.0%
. Downward adjustment for increased efficiency in electrical equipment[3]	-0.1%
. Downward adjustment for conservation[3]	-0.2%
. Adjustment for new alternative energy forms	-0.0%
Adjusted Average Growth Rate	5.6%

On the basis of these considerations, it would appear that a forecast growth in Ontario's consumption of electric power over the 1975-1985 period can be set in the neighbourhood of 5.5 per cent per year, in which case total

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1. The calculations of the effect on households raised the control projection average growth rate (1975-1985) from 3.3 to 4.1 per cent, a difference of 0.8 per cent. This difference is weighted by a probability of 0.75 on a judgmental basis to yield 0.6 per cent.

2. This is a pure guess. It amounts to over 12 billion KWH in 1985, or some 15 per cent of the control projection of 82.9 billion KWH for the combined manufacturing, mining and commercial sectors.

3. These are rough guesses.

annual consumption in the residential, manufacturing, mining and commercial sectors would reach a level of about 110 billion KWH in 1980, and 144 billion KWH in 1985.

A tentative projection for growth in the 1985-1995 period could be the one emerging from Scenario A, which is in the order of 5 per cent per year. This, however, is a first approximation and would need to be refined as the period is approached.

It is entirely valid to pose the question, "Under what circumstances might Ontario's demand for electricity continue to grow at historical rates averaging close to 7 per cent?" The conditions favouring such an outcome in the next two decades would appear to include:

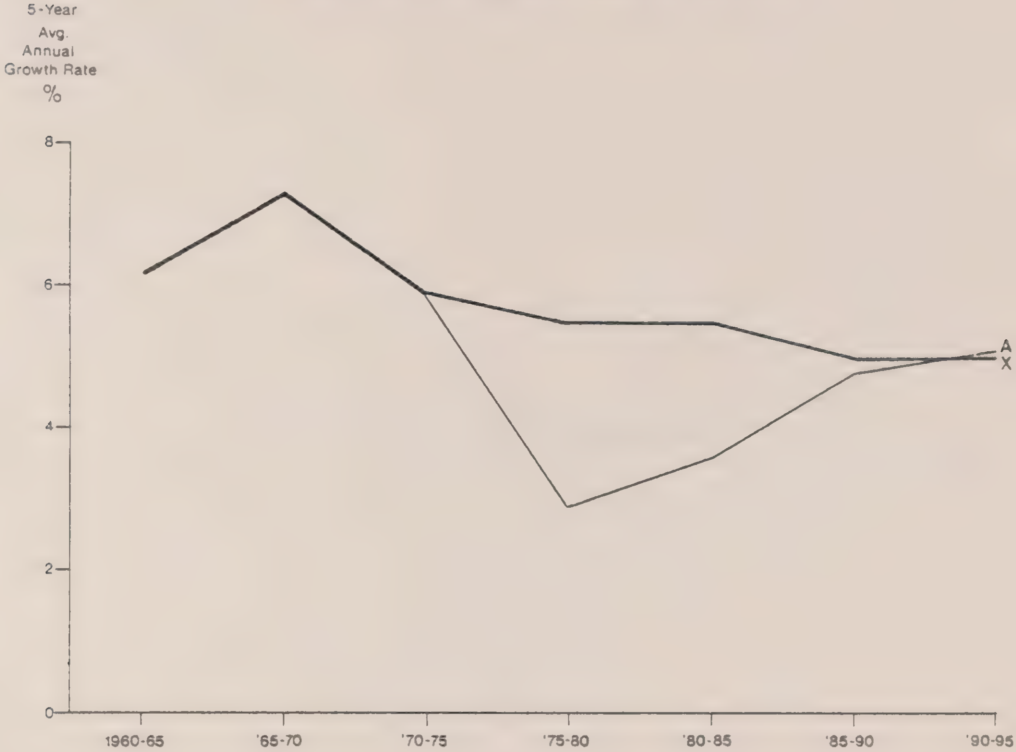
- progressive decline in electricity prices relative to those of mainly oil and natural gas
- sudden reversal of the down-trend in birth rates and considerable easing of Canadian immigration policy
- expansion of the world economy and less rapid inflation in Canada relative to the United States, Japan and Eastern Europe so that Ontario's exportable goods and services could retain or improve their penetration
- deliberate policy by Canada to reduce oil imports even if a self-reliance strategy holds little promise
- lack of success in developing a conservation ethic with respect to energy and failure in developing or purchasing energy-efficient technology.

It is possible that such conditions would prevail but at this point in time it would seem to be unlikely.

Chart 2

GROWTH IN ONTARIO'S CONSUMPTION OF ELECTRICITY

Projections With and Without Contingency Allowances



Legend: **A** - Control Projection (based on Probable Demographic, Economic and Pricing Conditions without Contingency Allowances)

X - Projection with Contingency Allowances in 1975-85 period

IV. CAPITAL AVAILABILITY

IV. CAPITAL AVAILABILITY

This section of the submission deals with the long-run availability of debt capital to finance electric power generation and transmission.

The financial community regards Province of Ontario and Ontario Hydro debt as close substitutes because Hydro's debt is guaranteed by the Province. Accordingly, the basic statistic used in this analysis is combined Ontario direct and guaranteed debt (herein referred to as "Ontario debt"). Since the Province will normally require some funds annually for retirements and liquid reserve accumulation and may resort to public borrowing from time to time for its own policy priorities, the forecast should not be regarded as capital available only to Ontario Hydro. However, traditionally by far the largest portion of such borrowing has been taken up by Ontario Hydro.

This section presents the Ministry's current views on capital availability. It should be noted that capital market analysis is a most intractable subject, influenced by so many intangibles that it is impossible at this stage to forecast with either precision or assurance.

The first part of this section compares the current forecasts of borrowing requirements and capital availability and identifies a potentially significant financing gap emerging circa 1980. Some of the issues associated with a capital shortage situation are briefly discussed. The second part discusses the methodology of capital availability analysis and the mechanics of generating a capital availability forecast. The final section presents the Ministry's best view of net new funds available to the Province and/or Hydro over the period 1976-1993 and summarizes some of the issues related to Ontario's borrowing potential over the period.

The Long Term Financing Gap

Historically, Ontario has made relatively modest demands on capital markets. Over the years, the combination of moderate borrowing and a very strong provincial economy has earned the Province a pre-eminent credit rating. In 1975, however, Ontario crossed an important threshold as borrowing increased by 400 per cent in response to rapid increases in both Ontario and Hydro expenditure programs. For the first time, combined public borrowing exceeded the amount that bond markets were readily willing to absorb. Some problems were experienced in the marketing of three issues. One major U.S. rating agency indicated that it had placed Ontario under assessment and would watch future financial developments closely.

Ontario moved rapidly to check the growth of its spending and hence its public borrowing. In testimony before the Select Committee Inquiring Into Hydro's Proposed Bulk Power Rates,[1] the Treasurer announced his intention to reduce the Province's deficit level to a level below its non-public borrowing sources. This objective was virtually achieved in the first year, and Ontario currently plans no net increase in publicly issued debt in the current fiscal year. Furthermore, Ontario Hydro reduced its public market borrowing to $1.5 billion annually from 1976 to 1978 and reassessed its long range capital construction program. Hydro subsequently announced a $5.2 billion reduction in its expansion program over the next decade.

It appears evident that Ontario has entered a new era in its financial evolution, one of continuous borrowing constraint. The recent actions of the Treasurer have assured the Province's ability to finance its requirements over the next few years. However, there is a prudent limit to Ontario's borrowing at reasonable rates and at this time it appears probable that, even if the Province does not borrow publicly for the next seven years, the capital markets could be unprepared to supply sufficient funds to finance Hydro's projected borrowing program beyond 1980.

The chart below contrasts the trends in Provincial and Hydro borrowing requirements and Treasury's current projection of borrowing potential to 1982. Hydro's

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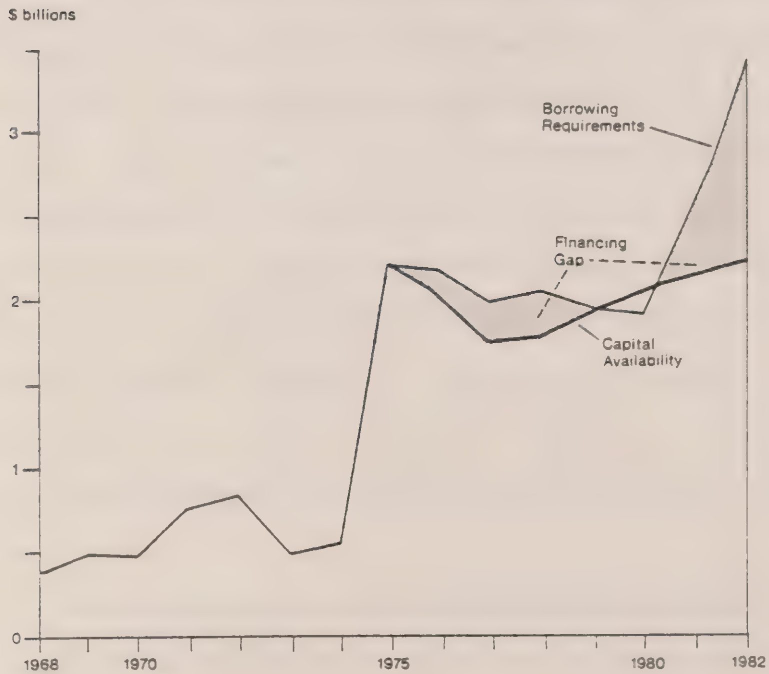
1. Select Committee Inquiring Into Hydro's Proposed Bulk Power Rates, Transcript of Hearing on November 12, 1975, Morning Session (H-078-2).

requirements are based on the latest published data, as presented to the Select Committee and somewhat exceed the $1.5 billion three-year annual borrowing target. Although the Province does not currently require any net public borrowing in the current fiscal year, provincial public borrowing requirements are assumed to be $500 million annually from 1976 to 1978 and minor amounts for retirements and liquid reserve accumulation are included thereafter.

CHART I
ONTARIO AND HYDRO BORROWING REQUIREMENTS
AND GROSS PUBLIC CAPITAL AVAILABILITY: 1968-1982



Source: Ontario Treasury Estimates

The capital availability projection is that discussed in the final section of the paper. Retirements have been added back to the net new borrowing estimate to derive a gross issue forecast.

The chart presents the estimated funds available to Ontario without endangering its preferred credit rating under a view of the most likely state of future world-wide capital markets. While the intention has been to make the forecast conservative, it is not difficult to envision several possibilities in which the projections could appear optimistic.

The major uncertainty in the projection is the future of the foreign bond sector of the U.S. capital market. The final effects of the serious financial problems of several local governments have not yet been fully felt. The remarkable growth of foreign issues in the U.S. over the past two years may saturate foreign debt allowances in the portfolios of large institutions. Also, there is a small but growing group who feel the U.S. may suffer its own capital shortage in the 1980's and become a capital importer. It is possible that a queueing system or even closure of the U.S. market to foreigners may be experienced at some time within the next decade.

The uncertainty of future borrowing potential makes it imperative that Hydro strive for the utmost flexibility in its long range planning and develop contingency plans for possible adverse financial developments. For example, in the unlikely event that the U.S. market closes to foreigners, total borrowing potential would fall by almost 50 per cent. While present borrowing capacity in other markets currently appears to be limited, opportunities in these markets are being vigorously pursued.

The ability of Ontario to issue debt is determined by the willingness of individuals and institutions to hold its bonds and notes. There are only two means of expanding Ontario's debt: by inducing lenders to hold larger percentages of Ontario bonds in their portfolios and by normal capital market growth. Although there may be some potential for expanding market share in the short term, in the long run the growth of Ontario debt is unlikely to exceed the growth of the capital market as a whole.

The capital availability 'problem' can be summed up and cast into bold relief by considering two simple trends. The combined capital requirements of the Province and Hydro are projected to grow at a 15.7 per cent rate (1976-82) while average capital market growth is estimated to be in the vicinity of 10 per cent. Unless a major alteration is made in one of these trends, a financing cap will emerge in the near future.

Approaches to Capital Availability Forecasting

Forecasting capital available to the Province involves estimating the total amount of public borrowing in world capital markets without impairment of Ontario's credit status. In doing so, one estimates the amount of debt lenders are willing to hold from year to year within traditional yield spreads.

Because of the major repercussions associated with excessive borrowing, it is prudent to build a significant element of caution into forecasts. On the other hand, as noted above, forecasts cannot take into account such major factors as the possibility of reduced access to the U.S. market by foreigners and in this respect they must be considered optimistic. Finally, forecasts must take into account constraints imposed by the Province's determination to borrow at the best possible rate.

There are two approaches to the forecast of capital availability: the marketing approach, and the stock adjustment approach.

The Marketing Approach

The marketing approach to capital market forecasting addresses itself to the question, "given a particular credit status and normal market conditions, how much of the borrower's debt can be sold each year in the major capital markets of the world?" Some measure of capital market growth is then estimated; generally an historical growth rate. The growth rate is then applied to bond sales each year to derive a forecast for as many years into the future as is desired.

A popular variant on the marketing approach is to add a fixed amount, say $50 million, annually to the single-year forecast in each market in lieu of the growth rate estimate. A further popular variant is to multiply each forecast by a constant factor, say 0.5 or 0.8, to reflect uncertainty in the original estimate.

The striking advantage of the marketing approach is its simplicity. Furthermore, it requires a clear view of capital markets only one year into the future. The marketing approach is an excellent aid to the planning of next year's borrowing program within a long term borrowing plan, but has limitations with regard to longer term strategies.

The marketing approach contains certain technical features which potentially reduce its attractiveness as a vehicle for long term forecasting. Since it focuses on the short term it is highly sensitive to any peculiarities of the recent financial environment. For example, if mortgage demand is at a cyclical low, the amount of Ontario debt which can be marketed in the near term may well be in excess of its long-run trend. Also, since lenders are generally willing to temporarily devote a larger portion of their portfolios to a prime credit in a given year, the marketing approach may overestimate the sustainable long-run level of borrowing. An extrapolation of such an estimate may imply an increase in the penetration of lenders' portfolios that cannot be achieved.

There are other technical properties of the marketing approach which complicate the problem of its assessment. The focus is on gross issues rather than debt outstanding and this could leave the forecast incapable of making statements about its own implications for the lenders' portfolios and the borrowers' balance sheets. Because both portfolios and balance sheets are more critical than sales in any period when determining credit status, the marketing approach has the capacity to extrapolate a sizeable borrowing program (bond sales) that, if carried out, could result in the loss of the level of credit status taken as a given datum by the forecast. As a result, there is a possibility that a forecast produced by the marketing approach may be inconsistent with maintenance of credit status.

The Stock Adjustment Approach

The marketing approach focuses on the short-term sales question, "how much debt can a borrower sell?" The relevant question posed by the stock adjustment approach to assessing long term capital availability is, "how much cumulated debt are people willing to hold?" To answer this question, one must examine the portfolios of the individuals and institutions who hold Ontario debt.

Financial analysts and economists generally feel the stock adjustment, or portfolio allocation, viewpoint best describes the practical investment decisions of lenders. In highly simplified terms, at any point in time an investor can be viewed as having his total portfolio

separated into desired proportions of various types of securities. For example, he may desire 50 per cent bonds, 30 per cent mortgages, 20 per cent equities. Each sub-portfolio will be divided into, say, provincial bonds, corporate bonds, etc. and each of these in turn into the securities of individual issuers. Thus, at any time each portfolio will have a 'target' level of holdings of any security. If every investor were satisfied, i.e. in equilibrium, one could sum all of the target holdings of Ontario debt and arrive at the direct and guaranteed debt outstanding recorded on the Province's balance sheet.

In the search for means of expanding Ontario debt, there are only three options:

1. The lender may increase his target proportionate holdings of Ontario bonds;
2. The lender's holdings of Ontario bonds will grow with the natural growth of the portfolio; and
3. The portfolio may be initially out of balance and be brought up to the target level.

If one ignores for simplicity the disequilibrium situation (number 3. above), which is only a minor short run occurrence, there are only two ways for Ontario to increase its debt outstanding: increasing its share of individual portfolios, and natural portfolio growth.

For Ontario to increase its share of portfolios, it must compete with all other debt issuers who are attempting to do the same thing. There is no compelling reason to suggest Ontario should be successful in this endeavour.

The risk of expanding Ontario debt via increasing its share of individual portfolios is that there is some saturation point beyond which no more Ontario bonds will be accepted, however aggressive the sales effort. Indeed, it is possible that lenders may demand significant changes in yield to hold their current shares and it is quite possible that there would be a sell-off of existing debt holdings.

Consequently, there is a limit to debt expansion via increases in portfolio shares and should the Province, by aggressive marketing, succeed in saturating the portfolios of its customers, it could suffer uncertain but definitely adverse repercussions. Thus, even allowing for some increase in portfolio shares, after some point the future growth of provincial debt outstanding is limited to the rate of growth of individual asset portfolios.

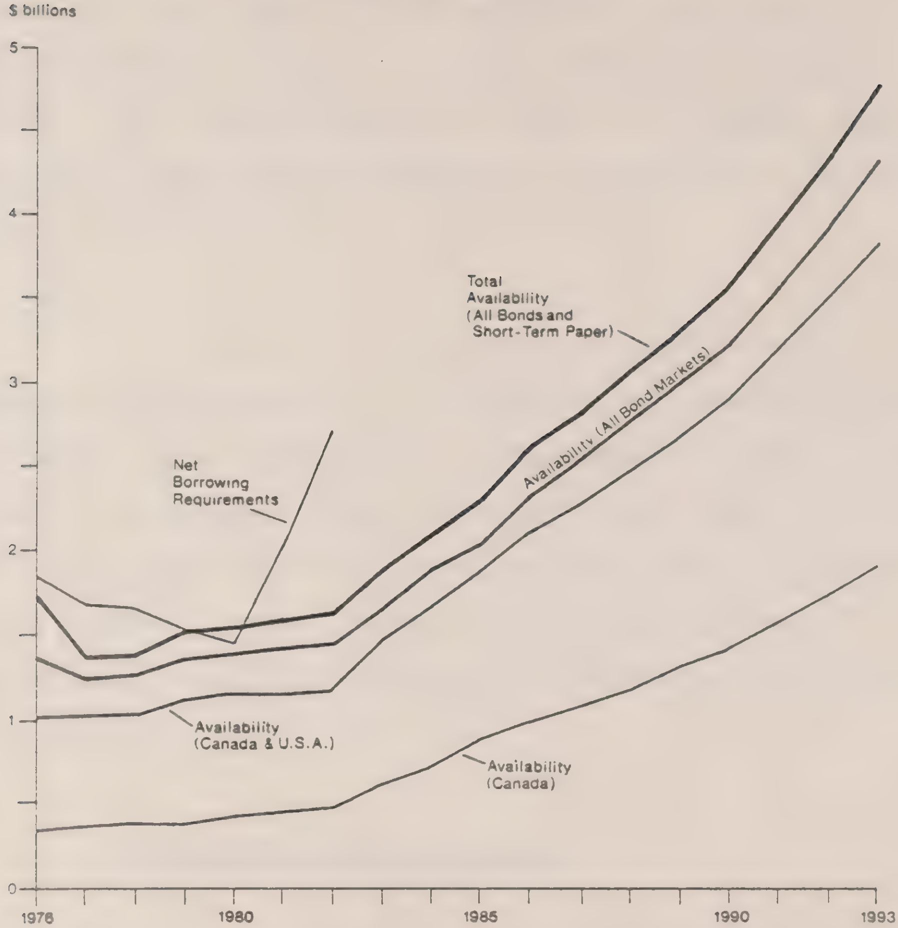
The stock adjustment approach to forecasting borrowing potential considers debt outstanding in the market as a whole. After adding all of the portfolios of individuals to derive an aggregate for total demand, the options of debt expansion become market share and market growth. In estimating the amount of Ontario debt people are willing to hold over time, one is, in effect, projecting the Province's balance sheet into the future. To make this projection, market growth must be forecast, and an estimate made of the ability of the issuer to increase its market share.

Such a projection produces a trend in debt outstanding over time. The year-to-year changes in debt are calculated to derive a forecast of net new borrowings. Since maturing securities must be rolled over into similar instruments to maintain target holdings, one may assume 'automatic rollover' of maturing debt. Hence, maturities are added to net new borrowings to derive the forecast of gross issues. This stock adjustment approach to forecasting seldom reproduces the results obtained from the marketing approach in long term analysis. The estimates presented below are based on the logical parameters of stock adjustment, namely, debt market growth and Ontario's potential share under a prime credit rating.

Detailed Availability Estimates

There are a limited number of capital markets available to Canadian borrowers who need to go outside the domestic capital market. The foreign sector of the U.S. bond market is one and a number of European markets plus some Middle East lenders is the other. In 1975, a year in which lending was inflated by temporary petro-dollar flows, this market, plus the Canadian public bond market, provided less than $20 billion of net new money. Of this, Ontario, in competition with all other Canadian and international borrowers, took nearly $2 billion. Future competition for funds may be so strong that such a rate of borrowing is not sustainable. Forecasts of the extent to which Ontario may use various markets are presented in the following chart and in the table at the end of this section.

CHART II
ESTIMATES OF NET PUBLIC CAPITAL AVAILABILITY
TO ONTARIO AND HYDRO 1976-1993



Source: Ontario Treasury Estimates

Since it is difficult to derive the explicit maturities and early retirements associated with a particular 20 year borrowing program, this forecast is presented in terms of net (of retirements) new flows.[1] Chart II presents the net availability cumulatively by market of preference

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1. In order to compare this forecast of net new flows with the current estimate of Hydro's gross borrowing program to 1982, Hydro's incurred maturities and publicly stated debt retirement program should be deducted from the gross borrowing estimates.

to afford the reader an appreciation of the extent to which Hydro is required to use all available sources of funds. This itself should be a source of concern, since access to some foreign sources has not yet been established on a permanent basis.

The discussion that follows provides a brief background commentary on the estimates of capital availability presented here. Each market is discussed in terms of the general parameters of the stock adjustment approach, which are the market's rate of growth and the share of the market that Ontario should prudently plan on being capable of utilizing. The forecast itself, as noted, is appended at the end of this section.

The Canadian Capital Market

Bond Market Growth: One of the most intriguing aspects of the Canadian capital market is the very slow rate of growth of bonds outstanding relative to other asset aggregates. There is no simple accounting for such behaviour and this question will continue to be one toward which future research efforts will be directed. However, one factor is surely the rapid increase in the demand for mortgage funds associated with Canada's high rate of family formation and rapidly rising property prices. Whatever the reason, the bond market has never managed to achieve an average annual rate of growth of greater than 7 per cent over any appreciable period of time.

The current outlook for future growth and inflation is one of moderation. As a result, it is difficult to project any significant increase in the bond market's rate of growth. National income is expected to grow less rapidly over the next twenty years, with a continuous but moderate decline in the potential growth rate. Inflation is also expected to ease slowly relative to recent experience.

A positive factor for the bond market is to be found in the housing sector. Residential construction is expected to require a smaller share of society's scarce resources as population growth falls so that, while relative housing prices may continue to rise, the demand for mortgage funds should be relatively less important in the longer term than in the recent past.

Based upon the bond market's historical growth pattern and the outlook for future growth and resource allocation, no marked increase in bond market growth until the 1980's is anticipated. Its average annual rate of growth is projected to be 7 per cent into the early 1980's, rising to 10 per cent in the late 1980's as falling mortgage demands offset the slower rate of growth of the overall capital market.

Ontario's Market Share: Ontario's share of bond market debt outstanding fell continuously during the 1960's, and, in this environment of bond scarcity, the Province was able to establish its reputation as a prime quality credit.

Since 1970, its share has increased substantially, and is currently at a level approximately equal to the average share over the last fifteen years. The projected private and public sector financing needs, particularly in energy related projects, of the next decade, indicate that the competition for funds in the market will increase. In such an environment, it is not felt that any compelling argument exists to suggest that Canadian lenders are willing to devote significantly larger proportions of their portfolios to Ontario debt. As a result, Ontario's relative share of the bond market has been projected at approximately the level achieved in 1975.

The Short Market: The market for more liquid assets (short-term paper) has grown significantly more rapidly than the bond market over recent years, and Ontario has generally made little use of it. However, this market should not be viewed as a long term source of funds for Hydro's capital expansion program. Its proper role is to serve as a normally unutilized reserve of borrowing capacity to satisfy unanticipated short run demands for funds. A projection of availability from the short term market is provided, but any projection of this volatile source of funds should be treated with extreme caution.

The short market is projected to grow at approximately the same rate as national income and Ontario's share of this

market is allowed a once-and-for-all increase in 1976. The result is that this market may not represent a major source of funds for Hydro's expansion program.

The U.S. Capital Market

Bond Market Growth: The U.S. bond market has grown at approximately the same rate, on average, as U.S. national income. On both a cyclical and secular basis, mortgage demands appear to have an effect on the relationship as well. The foreign bond component of the U.S. market has recently shown substantially more rapid growth, some of which results from the removal of the U.S. Interest Equalization Tax.

The long-run outlook for the U.S. is qualitatively the same as that for Canada. Real economic growth is expected to moderate through the 1980's, and inflation is projected to recede from the high levels of recent years. The bond market is projected to grow marginally faster than national income, with some acceleration in the 1980's to reflect subsiding demands for mortgage financing. The foreign sector of the bond market may grow faster than the market as a whole, a view which is optimistic but not inconsistent with several U.S. studies.

Ontario's Market Share: Historically, Ontario's share of foreign bonds outstanding has shown a consistent and continuous upward trend. There could be a continuation

of this trend over the next decade based on the recent move by the Province to utilize the private placement market. The forecast, as a result, contains a potentially unwarranted degree of optimism regarding U.S. capital availability. This particular issue is, and will continue to be, an area of concern as the projection is revised.

International Capital Markets

There are several overseas markets in the world which may be considered as a source of funds for the Province. These may be categorized as i) the Eurobond market, ii) Middle East sources, and iii) the foreign bond segment of domestic capital markets outside of North America. Only the first of these can be reasonably regarded as a long term source of funds. All have the disadvantage of offering shorter terms to maturity than North American markets. In addition, some of the restrictive terms, such as negative pledge and cross-default arrangements, are unfavourable to the borrower and are not necessary when borrowing in North America. Estimates of capital availability from these markets are given in the table at the end of this section.

Eurobond Markets: This market has grown rapidly since its inception in the late 1950's, and now has a stock of bonds outstanding of approximately $42 billion, of which about 60 per cent are denominated in U.S. dollars. Since the removal of the Canadian withholding tax, there has been a rapidly growing Canadian dollar segment.

The development, and indeed the very existence of this market, is distinguished by the degree to which it is a response to government regulation of domestic capital markets. Although there is some possibility that Euromarkets might come under closer government regulation, this is unlikely to come about in a way which would hamper its growth and efficiency. The participating funds are highly mobile, and could always find a haven willing to give them the freedom they desire. However, there is the danger of greater interference by European governments in the savings patterns of their citizens.

The position of Ontario in this market is difficult to gauge. There is some concern expressed that European portfolios have increased their holdings of Canadian bonds to such an extent recently that they will be unwilling to acquire significantly greater quantities in the future. Such a reaction would suggest that there may be more caution on the part of investors towards Ontario bonds no matter what previous borrowing volume in that market had been. In fact, Ontario has been a large borrower. These two considerations indicate that Ontario is approaching

the limit of its possible market penetration, and that henceforth, the stock of Ontario bonds in that market is unlikely to grow at a rate significantly faster than that of the market as a whole.

The stock of outstanding Eurobonds has grown at an annual rate of about 22 per cent since 1970, down considerably from the growth rates of the mid-1960's. This growth rate is projected to decline slowly in the years ahead, as the influx of petro-dollars is reduced, and as equilibrium is approached between Eurobond and domestic bond holdings.

<u>Middle East Sources</u>: On an overall basis, OPEC's annual financial surplus, which rose as high as $52 billion in 1974, is expected to disappear by 1980. These countries will then no longer be a net source of funds to the international capital markets, and may in fact be significant net borrowers.

Saudi Arabia, Kuwait, the United Arab Emirates and Qatar, which have substantial oil revenues, and limited means of spending them, will continue to run surpluses into the 1980's. Saudi Arabia, the most important of these, with a surplus in 1975 of about $18 billion, is unlikely to run a significant surplus beyond 1983. The five year plan for the years 1975-76 to 1979-80, although it will not be fulfilled in its entirety (it envisions the expenditure of $141 billion over the period), will nonetheless cause a substantial increase in imports in

the years ahead. Oil export revenues are also likely to come under pressure in the early 1980's. Saudi Arabia is likely to continue playing a leadership role in OPEC, and may have to make some concessions to the demands for increased revenues by other OPEC members by permitting its own production to decline. It could, however, try to set a floor under its minimum production levels by means of obtaining commitments to purchase oil from the major oil companies. Negotiations for such a commitment are still taking place. If it is obtained, Saudi Arabia would be able to exercise price leadership and also assure itself of a minimum level of oil revenues. This level is unlikely to be much greater than that prevailing at present.

For similar reasons, the surpluses of all of the Gulf States are likely to diminish by the early 1980's. The realization by these countries that their surplus flows are declining may prompt greater conservatism in their investment policies, and cause them to put a relatively greater part of their assets into shorter term investments, as opposed to bonds. Therefore, it would be imprudent to rely on these countries as a permanent source of funds beyond 1983.

Foreign Bond Markets: Bond markets of other countries are probably the most unreliable and risky sources of funds of those being considered. Some potential markets here are Switzerland, Germany, Japan, and France. In general, they are quite closely regulated by governments, who adjust total borrowing by foreign borrowers to suit domestic policy considerations. It is possible for such a market to be closed for many months at a time, or as in the case of Switzerland at present, for the queue of borrowers to attain such length that a two year wait is required. Also, a foreign exchange risk is involved since the proceeds of the loan are converted to Canadian (or U.S.) funds at the time of issue, and foreign currency must be purchased at maturity to repay the loan. Attempts to hedge this risk may be prevented by policy moves of the foreign government, which, in general, take place at such times when hedging would be most desirable.

It is useful to note that the Province of Ontario and Ontario Hydro, despite the risks involved, have tested and opened up these sources of capital to other Canadian borrowers by establishing a Canadian presence in these markets.

CAPITAL AVAILABLE TO ONTARIO: 1976-1993[a] ($ Millions)

	Canada						
	Bonds	Short	U.S.	Eurodollar	Middle East	Foreign	Total
1993	1950	475	1925	300		150	4800
1992	1775	425	1775	250		150	4375
1991	1600	375	1625	250		125	3975
1990	1450	350	1475	200		125	3600
1989	1325	325	1375	200		100	3325
1988	1200	300	1300	200		100	3100
1987	1100	275	1200	175		100	2850
1986	1000	275	1125	150		100	2650
1985	900	250	1000	150		75	2375
1984	750	225	950	125		75	2125
1983	625	200	875	125		75	1900
1982	500	175	700	125	50	75	1625
1981	475	175	700	125	50	75	1600
1980	450	150	725	100	75	50	1550
1979	400	150	725	100	100	50	1525
1978	400	125	650	75	100	50	1400
1977	375	125	650	75	100	50	1375
1976	350	350	675	150	150	50	1725

a) Net of retirements and non-public sources.

Source: Ontario Treasury Estimates.

V. ECONOMIC DEVELOPMENT ISSUES

A. Power Imports

B. Reserve Margins and Reliability

C. Economic and Regional Development Considerations

A. POWER IMPORTS

Over the past decades provincial power generating capacity has outstripped the growth in domestic consumption with the result that imports have declined to less than 10 per cent of the province's requirements. The bulk of imported power comes from the neighbouring utilities within Canada though supplies from the United States are important at times.

The interconnections with outside utilities have provided, and will continue to provide, distinct benefits to the Ontario power system. These include:

- improved frequency stability;
- increased system stability;
- sharing reserve capacity and support during emergencies;
- short term exchanges of least-cost energy;
- seasonal interchanges for reasons of diversity;
- coordination of maintenance; and
- joint development of generation.

In the context of import policy, interconnections have both a short term and a long term role. In the short term, import policy focuses on temporary assistance, energy swapping, maintenance coordination and seasonal interchanges. In the longer term, import policy might be aimed at firm power purchases and joint development of generation supplies.

It is accepted that advantages accrue from short term arrangements which enable Hydro to obtain power from neighbouring Canadian and U.S. utilities. In the case of north-south flows, differences in peaking seasons make interconnections extremely valuable for optimization of generating capacities. However, in the case of east-west flows, where similar peaking is experienced, the short term peak-time benefits might be somewhat more difficult to obtain (though other kinds of short term benefits might exist).

Consequently, policy with respect to imports from other Canadian sources must focus on the longer term potential benefits. To the extent that these neighbouring utilities can help meet Ontario's need, Ontario Hydro should explore the issue of securing supplies of firm power. This might also involve joint development of generation in other provinces.

Ontario Hydro could pursue this goal in the light of two of the government's key policy objectives regarding out-of-Canada power exports. The objectives are to avoid export of <u>firm</u> power to the United States which may hinder development of interprovincial system interconnections and to ensure that licenses to export be issued on terms that recognize Canadian priority. The corollary of these objectives is that the potential for interprovincial flows of firm power should be exploited to the greatest extent possible.

In this regard, then, the possibilities could be examined in very specific terms of securing power from both Quebec and Manitoba and through them from other provinces such as Newfoundland. Over the next decade or so it appears that Quebec may not require some portion of the power from the James Bay development and this might be secured for Ontario. Similarly, there might be opportunities for obtaining supplies from hydro sources that could be developed in Manitoba.

Major considerations which could be factored into the issue of firm power imports include:

- the possible desirability of hydro sources of generation as opposed to nuclear sources; and
- the marginal cost of delivering additional blocks of power to Ontario markets.

The cost comparison should be between the cost of producing and delivering power from the marginal source in another province and the cost of the power from the marginal source in Ontario. Since marginal sources in Ontario appear to be primarily relatively higher cost nuclear ones, it may well be that the hydro sources outside the province are more attractive. The potential for Hydro's participation in the development of these sources could be fully explored.

B. RESERVE MARGINS AND RELIABILITY

The reliability of an electric power system is important because of the obvious social and economic disruptions that result when there are interruptions in electricity service. While power outages are costly to interrupted customers and the community in general, it is significant that "reliability" is something that is purchased at a price.

It is obvious that if the cost of providing reliability is greater or less than the value of that reliability, there is a misallocation of the resources dedicated to the supply and delivery of power. This section deals with the adequacy of reliability measures, the value of reliability to electricity users and the matching of the costs and benefits of system reliability. While Treasury has conducted some analysis of the effects of varying levels of reliability on the economy and on Ontario Hydro's costs, there is considerable room for additional studies. For this reason, the Ministry looks forward with keen interest to the efforts and deliberations of the Royal Commission on these matters.

At any particular time, generation reserve capacity is the amount of installed generating capacity in excess of that needed to meet demand. For reliability purposes, reserves are necessary as a contingency against unforeseen generation breakdown and to provide a substitute source of electricity when units are taken out of service for maintenance purposes (planned outage). Larger reserves increase

reliability. Also, the higher the probability of generator breakdown (forced outage rate), the more reserves would be needed to maintain the same reliability standard.

Transmission "redundancy" refers to the excess transmission lines or multiplicity of paths by which power can be delivered to a community should any one line fail. Severe storms, material defects, and other occurrences can never be completely guarded against, and transmission redundancy increases the reliability of uninterrupted power delivery. Distribution refers to lower voltage transmission lines and circuitry serving within a community, and this also has a strong bearing on the reliability of service.

Measures of Reliability and Ontario Hydro's Planning Targets

Since reliability is so critically dependent on the the utility's generation reserve margin, one method of measuring reliability is simply to specify the percentage reserve margin -- the system with the larger margin has more reliability. This is acceptable in small systems where probability methods are questionable. Ontario Hydro uses a variant of this method for its West System, where its reliability standard is that reserve generation should equal the power of the West's two largest generators.

The Loss of Load Probability (LOLP) is the prime method used by Ontario Hydro to estimate the reliability of its East System, and the standard for most major North American utilities. LOLP uses the system's generation characteristics (forced outage rates, etc.) and forecast load data to arrive at the probability with which the system will fall short of meeting daily peak loads -- the probability of loss of load. This probability includes the likelihood of all magnitudes of power shortages -- ranging from a total system blackout to a localized shortage of few kilowatts lasting for a few seconds. Hydro has adopted the target that this probability should not exceed 0.0417% or 1/2400 or one day in 10 years (240 working days in a year). This means that, for the daily peak periods, the chances are at most 0.0417% that Hydro's generating capacity will be insufficient to meet the full demand. A LOLP of one day in 10 years does not mean power outages lasting on the average of one day in ten years. <u>The LOLP measure describes the probability of occurrence -- not the expected duration -- of a power outage of any magnitude</u>.

While the LOLP measure is undoubtedly a useful tool for comparing the reliability of different system expansion plans, in the context of cost-benefit analysis which will be dealt with later, the measure also has some deficiencies.

LOLP does not indicate the magnitude (megawatts), or duration (hours) of expected outages. Obviously, a total Ontario blackout would have far greater economic consequences than a small localized short-term power interruption.

LOLP is calculated using only the 20-minute daily peak loads. With each month's load shape consisting only of these peaks, the model of energy demand is not realistic and estimates of energy interruptions are distorted.

Also LOLP does not include the effect of interconnections. For example, Hydro is interconnected with Hydro-Quebec, Manitoba Hydro, Detroit Edison, Power Authority of the State of New York, Niagara Mohawk (N.Y.) and Great Lakes Power (Ont.). Hydro is also a member of the Northeast Power Coordinating Council (NPCC). These interconnections allow members access to pooled generation reserves. Each member's reserve requirements are consequently reduced below what they have been in isolation, to maintain the same reliability standard.[1] Past studies for the NPCC indicate that, depending on the assumptions, Hydro's emergency access to pooled reserves can add up to 12 percentage points to Hydro's "effective" generation reserve margin.[2]

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1. As larger systems need less percentage reserve margins, NPCC's percentage reserves need not be as high as each member's in isolation. Therefore, interconnected members have lower reserve requirements.

2. "Report on Guidelines for Long Range Transmission Planning for NPCC" (OEB Exhibit 76, 1974 Hearings).

Generation is the only component of reliability described by LOLP. Transmission and distribution are not included, although these are responsible for most power failures. Hydro has no probabilistic methods (analogous to generation reliability) for dealing with transmission and distribution reliability, and it is not possible to determine whether expenditures on transmission and distribution are a more effective way to improve total reliability than expenditures on generating capacity. U.S. studies have suggested a greater transmission/generation expenditure ratio since funds spent on transmission relaibility are believed to be more effective than that spent on generation reliability for the U.S. as a whole. The transmission/ generation expenditure ratio for the entire U.S. from 1965-1975 was 0.23. For Hydro, the figures were 0.13 in 1974 and 0.16 in 1975.[1]

Reliability and the Cost Benefit Approach

The basic rationale of this analysis is that the costs of providing reliability (generation, transmission and distribution) should be related to the value of reliability. The challenge is to estimate the costs of providing various

1. Annual Statistical Reports; Electrical World, March 15, 1975 and March 15, 1976.

levels of reliability and to estimate the value of those levels to electricity users. A common measure to make the comparison is desirable (e.g. dollars per kilowatt-hour interrupted).

With respect to the value of reliability, a qualitative description of the effects of a power failure is not difficult to prepare -- lights, elevators, subways, traffic signals, furnace ignitions and fans, stoves, refrigerators, air conditioners, clocks, television sets, computers, industrial machinery and anything run by electricity. To the extent that some electricity users have their own sources of electricity generation or stand-by power facilities, the effects of a power failure are ameliorated (hospitals, telephones, etc.). The effects are also reduced if users are given advance notice of a power failure and its expected duration.

For most interruptions, the longer the power failure the greater the cost. In the home, for example, the measurable costs are usually quite small for short interruptions in power. However, the costs of spoiled food and substitute restaurant food increase if the power failure lasts a day or two. In business and industry, some useful work can be accomplished in daylight and with stand-by lighting (filing, clean-up, maintenance), but there are limits to these activities. Similarly, manufacturing firms may be able to supply customers by drawing down inventories for a period

of time. However, there is a point when sales are not possible and may be lost to other suppliers with resulting layoffs and lost wages.

It is apparent from a consideration of the above factors, that estimates of the cost of power interruptions have to be derived from intimate knowledge of the use of electricity and the affected businesses, institutions, or residences. Existing economic statistics are deficient for these purposes and thereby comprehensive user surveys are required. Through this means it should be possible to obtain estimates of the costs of power interruptions for the purpose of evaluating additional expenditures for power facilities and, indeed, Ontario Hydro has already launched consumer surveys for this purpose. While these surveys will undoubtedly be useful, the following limitations of the surveys should be noted:

- Costs cannot be estimated for some of the effects of a power failure (e.g. elevators, alarm systems, television sets).
- Cost estimates will vary with general economic conditions and the activities of specific firms. (Costs will be less in periods of recession or when a firm is shut down because of a strike.)
- Cost estimates will vary with the season (type of business, ability to use daylight).
- Costs will vary if users have some warning of a power interruption and its duration (preparedness).

A number of attempts have been made to estimate the costs of power interruptions to electricity users. One study indicated that in North America, the average costs for commercial buildings are about $7 per interrupted kilowatt hour.[1] Another study found that the cost was $2 per interrupted kilowatt hour for industrial plants.[2] An earlier study (1969) estimated average U.S. industrial costs at $0.95 per interrupted kilowatt hour.[3] Also in 1969, a Swedish study estimated a cost of $0.50/kwh for bulk power interruptions.[4] A simple calculation of the costs of the power interruption to London, Ontario in 1975 indicates a cost of $1.40 per interrupted kilowatt hour.[5]

With respect to the cost of reliability, preliminary estimates by Treasury indicate a cost of $3 to $4 per interrupted kilowatt hour at a reliability level of "one day in 10 years", assuming that the reliability is provided by combustion turbine units. Bulk power reliability costs would be higher when transmission and distribution expenditures are included.

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1. P.E. Gannon, A.D. Patton, C.E. Becker, et al, "Cost of Electrical Interruptions in Commercial Buildings", paper delivered to the IEEE Industrial and Commercial Power Systems Technical Conference, Toronto, May 5-8, 1975.
2. Reliability News, General Electric Company, July 1975.
3. "Power Survey Problems and Progress", Modern Manufacturing, July, 1969.
4. Costs of Interruptions in Electricity Supply, Committee on Supply Interruption Costs, Sweden, 1969.
5. Report on the Study of the London Power Interruption, July 25, 1975, Ontario Hydro, March 15, 1976 (PMA-76-2).

While the above estimates indicate that the costs of providing reliability may exceed the value of reliability, much more comprehensive studies are required. The customer surveys presently being conducted by Ontario Hydro should be particularly valuable in this regard.

Implications

Based on the foregoing and related analysis, the main implications of this section are outlined below. The Ministry hopes that the Royal Commission will consider this analysis and, possibly, it may wish to conduct additional studies along the lines suggested. It is also recognized that some of these suggestions are under active consideration by Ontario Hydro.

On a priority basis, Ontario Hydro should consider developing a comprehensive cost/benefit approach to system reliability. This would help to ensure that Ontarians are neither overspending nor underspending for reliable electric power service. Generation reserves account for a large portion of Hydro's reliability expenditures, and it is always useful to investigate target reserve requirements. Generation reliability measured by LOLP is somewhat inadequate for comparing the costs and benefits of system reliability since LOLP gives no indication of the extent of power outages likely to occur in Ontario. In addition, some estimate of the value of interconnections should be included in any

calculation of generation reliability. It may also be that the reliability of transmission and distribution could be measured more adequately by Hydro. Most power interruptions tend to be caused by transmission or distribution failures. Thus, there is a need to measure the effectiveness of expenditures on transmission and distribution in comparison with expenditures on generation.

With respect to measures to reduce reliability requirements, selective load shedding (i.e., interrupting power to specific customers or for specific applications) is a possible area in which to reduce the need for generating reserves and yet still provide the reliability to those users and uses where the need is greatest. There are a great many applications where electricity supply can be cut for short periods of time with only a minimal effect in terms of cost and inconvenience to the public (e.g., lighting levels, clothes dryers, air conditioners).

In addition to load shedding procedures, the installation of emergency standby generators reduces the need for reliability provided by the utility. Accordingly, the costs of standby equipment should be compared with the costs of providing the same levels of reliability by Hydro. It also appears desirable that a study should be conducted to determine the Ontario inventory of standby equipment. This is necessary to better assess the economic impact of power interruptions, and would indicate the types of businesses that would most require increased standby equipment investment or perhaps greater distribution reliability.

It is desirable that customers be conscious of the costs of reliability and therefore procedures to provide varying levels of reliability should be examined. Peak power and reliability pricing policies could also be examined to determine their suitability and the effect on reliability requirements.

C. ECONOMIC AND REGIONAL DEVELOPMENT CONSIDERATIONS

Earlier this year, the Government of Ontario released six reports on regional development strategies for selected areas of the province. They were:

- Ontario's Future, Trends and Options
- Northumberland Area Strategy
- Renfrew County Strategy
- Northeastern Ontario Strategy
- Simcoe-Georgian Area Strategy
- Toronto-Centred Region Program Statement

These reports, which were made available to the Commission at the time of release, are an extension of earlier reports dealing with broad aspects of planning and developing the socio-economic growth of the province. They are not intended as rigid blueprints; rather, they are designed to provide a basis for consultation with the public and local governments concerning the future development of the province.

Of necessity, the democratic process requires a strong public participatory role in planning. Local views, local interpretations and the valid concerns and perceptions of citizens, businesses and institutions are an integral part of a fair and judicious planning process. The Ontario Government has, therefore, been conscious of the need to present economic and social development concepts and proposals in a form which permits three types of response.

First, there is an extensive follow-up process involving study, modification and refinement of the strategies by joint provincial-local groups. This includes public response in addition to the inputs already received in compiling the proposed strategies. This liaison, therefore, incorporates the full range of political, technical and public involvement, and is designed to ensure a continuous and evolving planning process rather than a one-shot overlay of irrevocable provincial preferences.

Secondly, the planning process has to have a realistic capacity to respond to change. Frequently, the combination of changes in the economic and social environments can shift policy priorities and substantially amend the constraints within which economic and social policies operate. As an example, issues such as energy price increases, and a more questioning attitude in some municipalities towards population growth, could materially affect the location of industry, and the rate and composition of economic expansion in Ontario. Within Canada we have seen, within the space of a few years, a rapid rise in the concern for energy issues. We now begin to see that concern expressed in government programs and policies and in structural adjustments in the economy.

A third and most important function of the public response process is the refinement and identification of the constraints to economic and social policy. These constraints take many forms; some can be readily recognized by governments, others are elusive. For example, the Government will likely rely

very heavily upon the findings of this Commission concerning the technical constraints to various configurations in Ontario Hydro's expansion options over the next two and a half decades. Members of the Commission will be aware of the connection between the electrical power system and the location and composition of economic development in the province. Members will also be aware of issues relating to the environment, the conservation of energy and the protection of farm lands. The Ministry will look to the Commission to assist it in identifying the appropriate relationships between these issues and the expansion of the electric power system.

In this submission, the Ministry of Treasury, Economics and Intergovernmental Affairs has presented analysis which relates to the financial constraints of various levels of expansion. It also presents an analysis of demand growth under different price and economic growth scenarios. It is hoped that in its explorations, the Commission will be able to expand the range of inquiry concerning policy constraints, the limits of foreseeable technology, and costs and trade-offs in the energy policy area. Many of the answers to these problems are imbedded in areas of technical expertise beyond the financial and economic skills of the Ministry. Others are to be found in public opinions, preferences and values. These are areas where the assistance of the Commission will be invaluable in assessing and reconciling the many costs and benefits of alternative public policies in the use of electrical energy as a development tool.

The Government has generally not adopted fixed positions on Ontario Hydro's role in the economic development process. There are, however, some proposals which have been advanced from various sources as examples of positive implementation in economic and social development. The next few parts of this section deal briefly with these and indicate some of the broad economic policy considerations which enter into the picture, and also some of the matters in which the Government would benefit from technical advice and public response.

Transmission Facilities and Rights of Way

The precise distribution of electrical energy demand throughout the Province is not a forecastable entity, especially twenty years away. As was pointed out above, the planning process has to maintain a degree of continuous adaptability to social and economic change. It will be as important for the economy to be able to take advantage of unforeseeable opportunities as it will be for society to manage growth in broadly specified patterns. In this respect, rigid policies for transmission line size and location over the next twenty years do not seem to offer many advantages to the planning process. But, an examination of the technical underpinnings which are likely to put limits on the flexibility of economic policy would be both useful and essential.

There is a possible conflict, or cost trade-off, between the various transmission line configurations with, say, large energy centres as opposed to a more dispersed system of electrical generation. The optimal arrangement of transmission line facilities is a complex social, economic and environmental matter and the Government has attempted to open up the way for a consolidation of the costs and benefits in policy initiatives such as the Parkway Belt West. However, this, too, involves more than a simple decision to create a utility corridor. The social costs of such corridors are particularly difficult to estimate, even in a qualitative way. The financial and economic costs will be easier to approach, but probably considerable in their magnitude and, as yet, are unknown.

There are, doubtless, technological possibilities of changes in the nature of transmission facilities in future years. The Commission's counsel on the costs, benefits and feasible public policy alternatives in all of these areas of concern would be invaluable to governments and the public in future planning processes.

Site Selection

It is hoped that through these hearings, some guidance can be provided on the broad weighting of factors in site selection. Most generating facilities have, to date, been established on large bodies of water.

This apparent need raises the issue of alternative technologies to deal with heat disposal and the costs of these technologies, now and in the long-term future.

The identification of the timing, type and cost of feasible alternatives to the existing heat-disposal systems, both for Ontario Hydro and other energy-effluent industries, would open up the possibility of alternative land-use patterns and provide a greater level of potential flexibility in the economic, social and environmental planning process. Also, where marginal applications of existing or new heat-disposal technology require public subsidies for their introduction, the allocation of costs is an important concern for public finance policy, or for an electrical energy pricing policy.

Currently, there are no hard and fast guidelines or weighting factors conditioning site selection. The Ontario Government has not advocated a static formula but recognized that a combination of technical assessment and public viewpoints should guide such decisions. In choosing the optimum locations in future years, it is conceivable that the range of constraints and considerations to be taken into account will increase. If it is a realistic expectation that site selection is to be more difficult and costly for

any reason, then proposals for dealing with this process would be of material benefit to the public, to governments, and to Ontario Hydro.

Generating Facilities

It has been proposed that Ontario consider expanding the capacity of the electrical power system by the construction of a few, large energy centres. There are certain technical aspects which have to be more fully understood before this option can be entered into with confidence by the public planning process:

1. The impact on the productivity of Hydro's capital investments.

2. The implications for capital borrowing by Ontario Hydro, would they be larger or smaller as a result?

3. The environmental problems of a concentrated order which could arise.

4. Community employment impact. Large, continuous construction crews could be a feature of these facilities if they were in a state of continuous expansion. The operating and maintenance employment would be much smaller. A discontinuous or irregular program would produce employment fluctuations and, depending on the size of the community, a degree of economic instability.

5. What would be the economic and social spin-off effects of the proposed centres? There would be demands on local facilities such as schools, housing, hospitals, sewage and water, and so on.

6. What would be the implication for transmission facilities? Would they require more land and be more expensive?

Once again, the technical assessment and views of the Commission, and the public, would be most welcome to the Ministry in weighing the potential effectiveness of energy centres as a development tool.

Rate Structure

Rising electrical costs will probably somewhat restrain total demand growth in future years, given that electrical prices rise in a manner consistent with other energy prices, and given also that supply shortages in competing energy forms do not force customers to use electricity where they might normally have used fuel oil, coal, or natural gas. The technical factors which price shifts will influence need to be more fully explored, since they may, in the long run, have a perceptible influence on economic growth.

It has long been a policy of successive Ontario governments and Ontario Hydro to provide power at the lowest possible cost with a price structure which is relatively uniform across the province. It has not been past policy to directly attempt to influence the location decisions of businesses by means of the rate structure. Any attempt to do so would involve a very complex problem for the equitable redistribution of costs among various users.

The allocation of costs among users is, therefore, intended to be neutral in its economic impact, and to generally maintain a competitive cost structure for our industries. Should the Commission feel that alternative rate structures will be more appropriate to future conditions, we would direct their attention to the following areas of concern that would arise from any change in the system:

- Would the change penalize existing industries for past decisions to locate on the basis of availability and price of electricity?

- What principles would replace those of uniform cost and equality of access?

- How would any change affect the growth in demand for electrical energy?

- How would any change affect the composition and location of employment and economic activity?

- Who would bear the adjustment costs?

- Who would get the adjustment benefits?

- What would be the long-run impact on Hydro's investment and borrowing activities?

One particular aspect of rate structures that may need close examination is marginal cost pricing. Present pricing practices make it possible for a large class of users to consume additional blocks of electric energy at diminishing costs per KWH. There might be some justification for such a practice if a supplier is producing under

conditions of declining average costs. However, a utility's revenue could be strained if alternative pricing methods are not adopted in the face of increasing average costs of installing new facilities.

Since a power supply system is subject to varying loads within each day and from season to season, and since the costs of expanding the system are heavily influenced by peaking patterns, it may be appropriate to develop pricing policies that distinghish between peak and off-peak usage. One possibility is to identify periods of the day when peak prices would apply and to supplement this scheme with differential seasonal rates. Another possibility is to identify certain types of appliances and equipment for higher rates during peak times.

Treasury would welcome the views of the Commission on these and other methods of pricing that recognize the need to relate prices at the margin to costs at the margin. It is perhaps true that one cannot readily calculate marginal cost. However, the existence of peaking phenomena and the fact that power from new facilities might be more costly than what is obtained from existing facilities suggest that current rate structures may be inappropriate in the future.

To the extent that a form of peak-load pricing is feasible, it could result in a spreading out of loads and some curbing of load growth. The direct benefit of this would then be a reduction in the need for supply facilities, particularly generating plants.

APPENDIX

Economic Impact of Hydro Rate Increase

ECONOMIC IMPACT OF HYDRO RATE INCREASE

Ministry of Treasury, Economics and
Intergovernmental Affairs

October 1975

SUMMARY

This study evaluates the potential impact on the Ontario economy of the power rate increases proposed by Ontario Hydro for 1976. Assuming that Ontario Hydro implements a 25 per cent rate increase (rather than the 26.6 per cent recommended by the OEB) and that municipalities pass on the full amounts to final users in 1976, the effects on the Ontario economy over one year are likely to be:

- a 0.33 per cent increase in the average level of consumer prices (CPI);

- a redistribution of some $280 million from individuals and businesses to Hydro, the net result of which might be a reduction of 0.1 per cent in real growth in gross provincial product;

- a loss in potential employment creation of close to 2,000 jobs in the province;

- a direct increase in 1976 electricity costs (from 1975 levels) of $76 million for domestic and farm users, $118 million for industrial users and $86 million for commercial users;

- an increase of about $3.16 in the monthly electricity bill (or just over $38.00 per year) for a typical residential user currently paying about $14.40 per month; and

- an increase of $6.34 in the monthly bill (or about $76.00 per year) for a typical farm user consuming 15,300 KWH per year.

ECONOMIC IMPACT OF HYDRO RATE INCREASE

This paper deals with the economic impact of increases in the price of electricity. Ontario Hydro's proposals to the Ontario Energy Board had called for an increase of some 25 per cent in 1976 prices and the Board has recommended a 26.6 per cent increase. While it is not yet clear which of these Hydro will in fact implement, it will be assumed for the following analysis that a 25 per cent increase will prevail. It will also be assumed that municipalities will pass on the charges to final users during 1976.

Impact on the General Level of Prices

Studies done by Treasury on the impact of oil and gas price changes in 1974 showed that significant inflationary effects emerge throughout the economy in response to unexpected, externally imposed energy price shocks, and that the effects could take years to work their way through the system. The proposed electricity price increase does not in its entirety represent a new shock to the economy, since it incorporates some passing through of cost increases generated by earlier inflationary pressures.

The 25 per cent electricity price increase is expected to produce new revenues of about $280 million in 1976 designed to offset cost increases, principally for fuel used in generation (about $150 million), other operating costs, depreciation and interest. It is estimated that of the $280 million, an amount in the range of $160 - $180 million would be primarily due to the pass-through

of fuel cost increases and to production increases. Hence, the net "cost pressure" that comes as a new shock to the economy in between $100 million and $120 million in 1976 as a result of electricity price increase. This corresponds to an independent price increase of close to 10 per cent for electricity and it is this element which will form the basis for additional inflation throughout the economy.

Like petroleum, electric power enters into just about every commodity in use and price changes can be expected to filter through the entire system with effects not only on the general level of prices but also on wages and other costs. Taking account of links between electricity prices and consumer budgets, it is estimated that the 10 per cent increase in electricity prices would generate an increase of about one-third of one per cent in the average level of consumer prices over a year.

Hence, the net result of a 25 per cent price increase by Hydro, when stripped of pass-through effects of previous inflationary forces, does constitute a new inflationary source. However, the contribution that it might make to the general level of prices in Ontario does not appear to be very great.

Impact of Economic Growth and Employment

The effect of the price increase on Ontario's economic growth and employment is quite similar to a situation in which income is transferred from consumers and businesses in the province to the public sector and re-spending takes place almost concurrently. This is quite different from the oil-gas case where revenues were being transferred out of the province and re-spending was subject to significant delays.

Whether the redistribution of income from individuals and businesses to Hydro has any impact on provincial economic growth and employment depends mainly on the extent to which Hydro's import propensity differs from that of electric power users. Adequate data are unavailable to permit a thorough examination of import propensities for different groups, consumers and industries in Ontario. However, it would seem that at the margin, Hydro's propensity is somewhat higher because of the prominence of U.S. coal in the fuel mix. It is estimated that the redistribution would result in a net increase in Ontario's imports of about \$40 million in 1976. Allowing for the fact that some of the income that is transferred from consumers to Hydro would have been saved by individuals rather than spent, the net withdrawal from the Ontario economy through the redistribution would amount to about \$30 million.

Losses in real production and employment in Ontario could result from this withdrawal. In broad terms, the reduction in real gross provincial product could be in the order of slightly less than 0.1 per cent while the loss in potential employment creation might be close to 2,000 jobs in 1976.

Impact on Ontario's Households and Businesses

If the 25 per cent rate increase is implemented, the addition to cost of consuming electricity in 1976 over 1975 is estimated at $76 million for domestic and farm users, $118 million for industrial users and $86 million for commercial users.

A typical residential user paying $14.36 per month in 1975 would face an increase of about $3.16 per month or just under $38.00 annually. A typical farm user of 15,300 KWH per year would find his monthly bill $6.34 more in 1976 than in 1975.

In Ontario's industrial sector, the largest users of electricity, in terms of dollar outlays, tend to be in the production of pulp and paper, iron and steel, industrial chemicals, auto assembly, parts and accessories, smelting and refining, and abrasives. Domestically, most of these enterprises might be in a position to pass on the increased costs of electricity. However, where exports are involved, the pass-through of costs might be limited by international competition.